# FLORIDA BAY SHALLOW WATER SURFACE DRIFTER


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**In response to NOAA/COP funded research needs for high resolution Lagrangian analysis of Florida Bay interior basin flow fields, a shallow water drift buoy was designed and developed by AOML and RSMAS in Miami, Florida.**


## SPECIFICATIONS:

**Buoy Dimension:**
Diameter - 36 cm. Height - 18 cm
Drogue Length - 75 cm

**Buoy Material:**
Housing - Thermoformed Polycarbonate
Drogue - Vinyl Sheeting

**Buoy Weight:**
Approximately 5.5 kg (13 lbs)

**Power:**
Alkaline D cell battery pack 15VDC

**Operational Life:**
Approximately 30 days

**Onboard GPS:**
Motorola ONCORE 12 Channel Receiver

**GPS Sample Rate:**
GPS position logged every 4 minutes
(variable setting, maximum 1 hour)

**Memory Capacity:**
16384 samples

**Sample Format:**
DATE, TIME, LAT, LON, PDOP, STATUS

**ARGOS Transmission Rate:**
90 seconds
(governed by ARGOS)

**ARGOS Transmission Format:**
3 most recent GPS strings (see above)

Setup, deployment, and upload of data recorder via RS-232 serial port.

There is concern that the Florida Bay ecosystem may be undergoing a transition from seagrass to plankton dominant production as indicated by large areas of seagrass die-off and persistent plankton blooms. The causes and consequences of these shifts are unclear, although hypersalinity conditions are believed to play a significant role. To help reduce stresses from hypersaline conditions that develop in interior basins of the Bay and restore a more natural fresh water delivery, the South Florida Water Management District (SFWMD) and U. S. Army COE are planning to redistribute surface water flow to the Everglades by increasing the flow to Shark River and Taylor Slough. The ultimate fate of this increased discharge to Florida Bay is still uncertain, as models to date have been unable to reproduce the observed spatial and temporal salinity patterns. Part of the problem has been due to uncertainties in the quantity and locations of fresh water inputs, but also due to the scarcity of precipitation and evaporation measurements and the poor understanding of the mechanisms and rates of inner basin exchanges.

Florida Bay is made up of a complex maze of shallow basins with depths ranging from 1 to 3 meters, separated by mud banks and mangrove islands, and connected by narrow channels. The mud banks are sometimes exposed during the dry season (typically winter/spring) causing further isolation of the basins. The need for a high-resolution analysis of the Bay's interior basin circulation was clear, however the choice of a Lagrangian device to track the flow was not. ARGOS tracked CODE drifters have been successfully employed to resolve near-shore transport processes. Unfortunately the Bay's unique geometry would prohibit the use of such drifters for two primary reasons: the CODE drifter's physical size (approximately 1 meter in height) is simply too large for use in the shallow depths of Florida Bay; and secondly, positioning by ARGOS triangulation is too coarse to resolve the small spatial scales of the interior basin flow field. Utilizing the improved accuracy of GPS positioning and packaging the drifter's electronics into a more compact housing, engineers at AOML and RSMAS developed a solution; the Florida Bay Shallow Water Drifter.

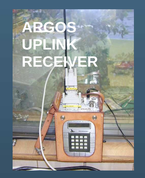
## DEPLOYMENT AND RECOVERY


PREDEPLOYMENT TESTING



DRIFTERS DEPLOYED IN WHIPRAY BASIN


TRACKING DRIFTERS PRIOR TO RECOVERY

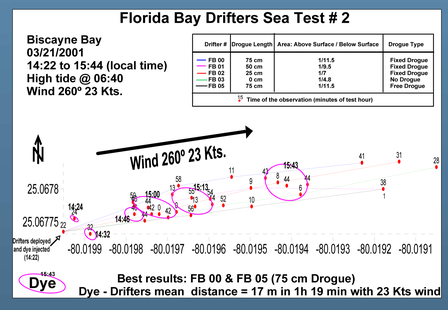


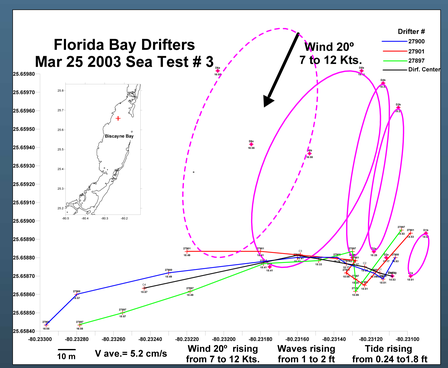


DRIFTER RECOVERED!

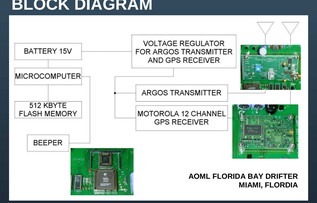
## SEA TRIALS

Three "sea tests" were done to check the coupling of the drifter with the water. Drifters with different drogue lengths, and co-located patches of colored dye (Rhodamine WT), were deployed in Biscayne Bay in a 10 and 23 knot wind. All of the drifters moved in the same direction as the dye patch. The drifters with the 75 cm drogues exhibited the best coupling with the water. The average difference between the drifter speeds and the dye patch speed was less than 1 cm/sec.




## BLOCK DIAGRAM




## DESIGN AND CONSTRUCTION


## PRELIMINARY RESULTS

To date, 8 cruises using the shallow water surface drifters have been conducted in the interior basins of Florida Bay. Both Whipray and the northeast basin have been sampled with the Florida Bay Shallow Water Drifter. A total of 68 drifter deployments have been conducted with a 98.5% drifter/data recovery success rate.

In both Whipray and the northeast basin of Florida Bay, the circulation is primarily wind driven and the drifters reflect this physical forcing. The flow is also constrained by the individual basin configuration and topography. These effects are illustrated for the northeast basin in the adjacent two panels.